BY ORDER OF THE COMMANDER AIR FORCE NUCLEAR WEAPONS CENTER

AIR FORCE NUCLEAR WEAPONS CENTER INSTRUCTION 63-112

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Acquisition

OPERATIONAL SAFETY, SUITABILITY AND EFFECTIVENESS (OSS&E)

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This Operational Safety, Suitability and Effectiveness (OSS&E) instruction describes how Air Force Nuclear Weapons Center (AFNWC) acquisition and/or sustainment organizations will manage OSS&E. This instruction establishes and documents guidelines, processes, stakeholders, roles and responsibilities of OSS&E activities in accordance with Air Force Instruction (AFI) 63-1201, *Life Cycle System Engineering* and Air Force Material Command Instruction (AFMCI) 63-1201, *Implementing Operational Safety Suitability and Effectiveness (OSS&E) & Life Cycle Systems Engineering (LCSE).* This instruction applies to all programs within all AFNWC organizations except for the 377th Air Base Wing. This publication does not apply to Air Force Reserve Command (AFRC) units. This publication does not apply to the Air National Guard (ANG). Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at **https://www.my.af.mil/afrims/afrims/afrims/rims.cfm**. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the Air Force (AF) Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional's chain of command. This is the initial publication of this instruction. See **Attachment** 1 for Glossary of References and Supporting Information.

1. Applicability and Scope.

1.1. This instruction establishes consistent and uniform OSS&E responsibilities throughout AFNWC and clarifies AFNWC OSS&E roles. This instruction establishes the guidelines, policies and procedures for AFNWC and subordinate organization personnel, who approve,

develop, implement, manage, or review OSS&E activities, products, performance, and requirements for systems, subsystems, end-items and services procured under AFI 63-101, *Acquisition and Sustainment Life Cycle Management*.

1.2. In accordance with AFI 33-360, *Publications and Forms Management*, **paragraph 2.3**, statutory law, Federal, Department of Defense, Joint Staff, United States Air Force (USAF), Undersecretary of Air Force for Acquisitions (SAF/AQ), and Air Force Material Command guidance, instructions, and directives take precedence over this instruction.

2. Work Products.

2.1. **Prior Work Products.** The following two work products shall be generated prior to, and are required as inputs for, all AFNWC OSS&E activities:

2.1.1. OSS&E Baseline Document (OBD), and

2.1.2. Systems Engineering Plan (SEP).

2.2. **Intermediate and Output Work Products.** The OBD and SEP may be updated as needed to reflect current program requirements and activities. In addition to the OBD and SEP, the following documentation may be generated or updated to support and document sustainment activities, as required:

2.2.1. Transfer Support Plan (TSP)

2.2.2. OSS&E assurance issues report, and

2.2.3. Reliability and Maintainability plan.

3. Roles and Responsibilities.

3.1. **AFNWC.** The AFNWC commander (AFNWC/CC) will ensure that AFNWC and all subordinate organizations comply with all OSS&E responsibilities established in AFMCI 63-1201, **paragraph 1.3**. The AFNWC Director of Engineering staff (AFNWC/EN) will conduct annual compliance verification with this policy.

3.1.1. AFNWC OSS&E responsibility and accountability for system or end item performance shall not be delegated to non-AFNWC organizations.

3.2. **Program Manager (PM).** The PM has OSS&E authority and responsibility. For programs without a designated PM, the assigned project manager shall have OSS&E authority and responsibility. For the purpose of this document, there is no distinction between a System Program Manager (SPM) and a PM. The PM, will:

3.2.1. Document OSS&E approach in the OBD.

3.2.2. Document when OBD will be brought under configuration control.

3.2.3. Coordinate OBD with using command:

3.2.3.1. Obtain using command signature on OBD, and

3.2.3.2. Coordinate OBD changes which impact customers/users.

3.2.4. If a TSP is required, the PM shall document the transition from Product to Logistic Center approach in the TSP, or appropriate equivalent (e.g., OBD, SEP, LCMP, etc.). This transition shall be documented post CDR-A, and sufficiently prior to Milestone C to

support the weapon system transition from acquisition to sustainment. The overall system/program management responsibilities are officially transferred from a Program Executive Office (PEO)/ Defense Acquisition Office (DAO) acquisition portfolio to an Air Logistics Center commander (ALC/CC) portfolio or other sustainment organization at the Sustainment Transfer Point. The TSP shall include OSS&E responsibility, the SEP documentation, data, the OBD, configuration baseline, and processes.

3.2.5. The PM shall prepare OBD and SEP, as appropriate, for Milestone C review.

3.2.6. The PM shall document engineering responsibilities for development support manager, system sustainment manager, Chief Engineer (CE), and lead engineer.

3.2.7. The PM shall annually report OSS&E assurance issues to Wing, AFNWC/EN, AFNWC/CC and/or PEO/DAO. OSS&E assurance issues to be reported annually shall include, at a minimum, system/end item OSS&E risks, trends and System Program Office OSS&E adequacy issues. The System Program Office OSS&E adequacy issues shall include, at a minimum: funding, manpower, and process limitations.

3.2.8. The PM shall develop an approach to address Reliability, Availability, Maintainability (RAM), and Supportability issues. The approach will be documented or referenced in either the SEP or the Life Cycle Management Plan. The approach will document realistic sustainment Key Performance Parameter (KPP)/Key System Attribute requirements and related supporting rationale and establish the process and methodology to assess, maintain, and/or improve RAM and supportability.

3.2.9. The PM will utilize metrics to track key Technical Performance Measures (TPMs), OSS&E and overall program/project health. The PM will ensure personnel assigned to perform SE mission assurance type duties are appropriately trained in System Engineering, System Security and OSS&E.

3.3. **CE.** The CE is responsible to the PM for OSS&E establishment, including proper control of system or end item configurations. For the purposes of this document, the distinction and differentiation between CE and Lead Engineer authority, roles, and responsibility is left to the PM.

3.4. **SCM.** The SCM is responsible to the PM to ensure that:

3.4.1. Ensure parts meet OSS&E product requirements, and

3.4.2. Coordinate part changes that impact OSS&E products with the PM in order to maintain system-level OSS&E.

4. OBD Requirements.

4.1. **OBD Contents.** The OBD shall serve as the single reference for all essential characteristics/information for safe, effective operations, upgrades, maintenance, and sustainment of system/end-items. An annotated OBD template is included in **Attachment 2**. At a minimum, the OBD shall contain system-level and/or end-item:

4.1.1. Identification procedures and requirements

4.1.2. Configuration management (CM) procedures

4.1.3. Safety information

4.1.4. Suitability information

4.1.5. Requirements

4.1.6. Traceability connecting KPPs to system-level requirements

4.1.7. TPMs

4.1.8. Verification methods to meet KPPs

4.1.9. Effectiveness information

4.1.10. Technical data information

4.1.11. Any known limitations, deficiencies, waivers and variances; and

4.1.12. The OBD shall identify OSS&E metrics and tracking information and processes.

4.2. **OBD Development and Audience.** The OBD shall be created during system development. The OBD shall be verified prior to delivery of the system. The OBD shall be provided to operators/maintainers/sustainers prior to the end of Initial Operational Capability. The OBD shall be updated as changes occur, and included or referenced in the SEP.

5. Prescribed and Adopted Forms.

5.1. Adopted Forms.

AF Form 847, Recommendation for Change of Publication

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Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 33-360, *Publications and Forms Management*, 18 May 2006

AFI63-101, *Acquisition and Sustainment Life Cycle Management,* 17 April 2009

AFI63-1201, *Life Cycle System Engineering,* 23 July 2007

AFMAN33-360, *Management of Records*, 1 March 2008

AFMCI63-1201, *Implementing Operational Safety Suitability and Effectiveness (OSS&E) and Life Cycle Systems Engineering (LCSE),* 14 October 2009

Abbreviations and Acronyms

AF—Air Force

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFMCI—Air Force Material Command Instruction

AFNWC—Air Force Nuclear Weapons Center

AFNWC/CC—Commander, Air Force Nuclear Weapons Center

AFNWC/EN—Director of Engineering, Air Force Nuclear Weapons Center

AFRC—Air Force Reserve Command

AFRIMS—Air Force Records Information Management System

ANG—Air National Guard

DAO—Defense Acquisition Office

DSN— Defense Switched Network

CAP—Combat Air Patrol

CAT—1—DRs Category 1 Discrepancy Reports

CE—Chief Engineer

CM—Configuration Management

CONEMP—Concept of Employment

CONOP—Concept of Operations

CND—Can Not Duplicate

FMECA—Failure Modes, Effects, Criticality Analysis

I&M—inspection and maintenance

IER—Information Exchange Requirements

IFE—In-Flight Emergency

IFMS—Integrated Facility Management System

LCSE—Life Cycle System Engineering

m2—square meter

O&M—Operations & Maintenance

OBD—OSS&E Baseline Document

OPR—Office of Primary Responsibility

OSS&E—Operational Safety Suitability and Effectiveness

PEO—Program Executive Officer

PQDR—Product Quality Deficiency Report

PM—Program Manager

PPE—Personal Protective Equipment

PSH&T—Packaging, Storage, Handling, and Transportation

R_0—detection range basis

RAM—Reliability, Availability, Maintainability

RCS—Radar Cross-Section

RDS—Records Disposition Schedule

SAF/AQ—Undersecretary of the Air Force for Acquisitions

Sat—satisfactory

SEP—Systems Engineering Plan

SCM—Supply Chain Manager

STAR—System Threat Assessment Report

std—standard

TCTO—Time Compliant Technical Order

TO—Technical Order

TPM—Technical Performance Measures

TSP—Transfer Support Plan

URs—Unsatisfactory Reports

USAF—United States Air Force

WRM—war reserve materiel

Attachment 2

ANNOTATED OSS&E BASELINE DOCUMENT (OBD) EXAMPLE

The following information is provided as an example of an OBD. The general example includes information that may not be appropriate to AFNWC systems. The OBD should be tailored to be specific for each program. A template header is shown in **Figure A2.1**. Additional annotations have been provided to identify additional useful information in the OBD. AFNWC/EN shall review each new OBD prior to approval. Modifications of the OBD shall be documented. To maintain an unclassified OBD, some items may be maintained in a separate classified annex. **Note**: The following terms are used in the example information and have not been defined previously: Defense Switched Network (DSN), Failure Modes, Effects, Criticality Analysis (FMECA), Technical Orders (TOs), Time Compliant TOs (TCTOs), Can Not Duplicate (CND), Personal Protective Equipment (PPE), Specialized Packaging, Storage, Handling, and Transportation (PSH&T) requirements, Information Exchange Requirements (IERs), war reserve materiel (WRM) requirements, Integrated Facility Management System (IFMS), system threat assessment report (STAR), Concept of Operations (CONOPs) or Concept of Employment (CONEMP), inspection and maintenance (I&M), In-Flight Emergency (IFE), Product Quality Deficiency Report (PQDR), standard (std), Category 1 Discrepancy Reports (CAT-1 DRs), Unsatisfactory Reports (URs), Operations & Maintenance (O&M), satisfactory (Sat), Combat Air Patrol (CAP), detection range basis (R_0), m^2 (square meter), and Radiation Cross-Section (RCS).

Figure A2.1. OBD Header

	☐ System ☐ End-Item ***SPM:*** *(name, org, and DSN phone)* ***CE/LE:*** *(name, org, and DSN phone)* ***Baseline Date:*** *(date)*	**Identification** ***Name:*** *(system/end-item commonly used name)* ***Designation:*** *(system/end-item designation)* ***Model Number:*** *(model number(s) this baseline applies to)* ***Serial Numbers:*** *(serial numbers this baseline applies to)* ***Total Inventory:*** *(total number of systems/end-items covered by this baseline)*

As shown in **Figure A2.2**, the baseline referenced in section A of the OBD shall be under configuration management control. The OBD shall include an identification of requirements documents, engineering drawings, temporary modifications, and major configuration concerns. Identification procedures and requirements and configuration management procedures will be described or referenced in Section A.

Figure A2.2. Configuration

A. **Configuration**
CM Baseline: *(reference approved system/end-item level baseline and drawings, and approved changes)*
Specifications: *(reference key system-level spec document and tech data library)*
Software Versions: *(state approved software versions such as OFP, mission-systems, etc – state any known incompatibility with prior software versions or other model/serial numbers*
Interfacing Equipment: *(list any significant support equipment, tools, test sets, or other items by type and approved models/versions – note any known incompatibilities)*

The OBD shall identify Failure Modes, Effects, Criticality Analysis (FMECA) currency. FMECA results shall be identified or their source reference identified to maintain an unclassified OBD. The OBD shall identify Critical Safety Items in the Safety section, as shown in **Figure A2.3**. The source reference may be identified to maintain an unclassified OBD.

Figure A2.3. Safety

B. Safety
High/Serious Risks: *(state any TCTOs, inspections, procedures, or operating limitations in place to mitigate high/serious risks – include note to report recurrence of any serious CND events; state specific hazardous materials or conditions and reference sources for safe procedures, PPE, etc)*
Safety Measures: *(reference top-level sources for safe operations, inspection, and maintenance)*
Safe Operations: *(cite specific sources for all required training and procedures for safe operations)*
Safe Maintenance: *(cite specific sources for all required training and procedures for safe maintenance)*

The OBD shall identify key specific requirements source documents in the Suitability section, as shown in **Figure A2.4**. Unclassified requirements may be identified directly.

Figure A2.4. Suitability

C. Suitability
Product Support Strategy: *(briefly describe the overall product support strategy)*
Availability: *(describe overall availability target and any special factors)*
Compatibility: *(summarize system/end-item compatibility with other operational systems; highlight or reference any special conditions, procedures, modes of operation; or known incompatibilities that could occur)*
Transportability: *(cite relevant references for deployment footprint, PSH&T requirements, etc)*
Interoperability: *(reference documented IERs and standards for physical/information interoperability – cite certification approval and data if applicable)*
Reliability: *(reference reliability requirements and source documents for design and maintenance of reliability; cite specific RAM analytical model versions are applicable for this baseline)*
Usage: *(summarize or reference designed service life, usage rates, and environments)*
Maintainability: *(cite documents for all maintenance procedures)*
Human Factors: *(summarize or reference any special operations, inspections, or maintenance required for life support equipment and reference standards for human systems interfaces)*
Architectural/Infrastructure Compliance: *(reference architecture baseline and state any issues with compliance with user-expected infrastructure [physical and networks] – cite standards for ops and maintenance to maintain compliance*
Manpower Supportability: *(summarize logistics support organizations and the manpower and skill levels required; briefly summarize support manpower required to forward deploy)*
Logistics Supportability: *(describe spares, equipment, tooling required for logistics support – cite any special WRM or IFMS or other requirements)*
Environmental Effects/Impacts: *(reference or summarize known environmental effects that could degrade or disrupt system effectiveness, and source procedures to be used)*
Documentation: *(reference system/end-item TO library)*
Training: *(list by reference key training requirements and training materials for ops, maintenance, and supply)*

Maintenance and servicing procedure documents shall be identified or described in the "Tech Data" section. Engineering/technical support personnel shall be included in training requirements. Identify all mission critical operations, inspections, maintenance or support tasks required that must be performed to ensure mission success in the Effectiveness section as shown in **Figure A2.5**. Such information may be identified by reference to avoid a classified OBD.

Identify KPPs or major specification performance requirements. Provide traceability connecting KPPs to system-level requirements. TPMs and verification methods to meet KPPs may be described. These may be listed in separate classified documents.

Figure A2.5. Effectiveness

D. Effectiveness
Key Effectiveness Parameters: *(reference requirements documents and verified performance specs)*

Threats/Vulnerabilities: *(reference specific STAR and/or other documented threats/vulnerabilities analyses)*

Effective Operations: *(reference doctrine, CONOP/CONEMP, OPINDOC, and TOs describing ops)*

Maintenance/Support: *(state or cite references of special or unique I&M to maintain effectiveness)*

Performance Envelope: *(reference operating envelop and capabilities envelopes)*

Limitations/Cautions: *(summarize major limitations/cautions on mission effectiveness or cite by reference)*

Include maintenance, inspection, and service procedure references in the Technical Data list as shown in **Figure A2.6**.

Figure A2.6. Technical Data

F. Technical Data
Operations: *(list definitive sources or library for operations procedures and technical data – state all requirements for reporting mishaps, IFEs, anomalous performance, and general operations data)*

Inspections: *(list definitive source or library for all inspections procedures and data – state all requirements for reporting non-conformances and general inspection data*

Maintenance: *(list definitive sources or library for all maintenance procedures and data – state all requirements for reporting non-conformances, unapproved mods, and general maintenance data)*

Supply Support: *(identify key product support managers and list definitive references for approved sources of supply – state all requirements for reporting PQDRs and other supply data)*

Training: *(provide definitive reference to all available training materials for ops, I&M, and supply)*

Known limitations that would be listed in **Figure A2.7**, may be referenced in a classified document, as appropriate.

Figure A2.7. Limitations, Deficiencies, Waivers & Variances

G. Limitations, Deficiencies, Waivers & Variances
(list all know limitations, deviations and waivers for this system/end-item

The details described in **Figure A2.8**, section H for the three OSS&E metrics categories (Safety, Suitability and Effectiveness) may not, in general, apply to any AFNWC OBD. Appropriate metrics shall be determined for each of the three areas and specified in the OBD. Unlike the example provided here, all identified metrics identified in the OBD must specify standard (std), threshold, or limitation data.

Figure A2.8. OSS&E Metrics

H. OSS&E Metrics
(working with the user, define key safety, suitability, and effectiveness metrics for monitoring of OSS&E. At least one parameter should be availability and one system/end-item reliability – the following are examples)

Safety	Suitability	Effectiveness
SE1 – Class A mishap rate Std = 1/100,000 flying hours	**SU1 – Mission Availability** Std = 75 percent (compute including all primary mission systems)	**E1 – Mean Detection Range** Std = R_0 ($1m^2$RCS) (CAP orbit altitude)
SE2 – Mishap Rate Std = 1/10,000 flying hours (combined Class A/B/C)	**SU2 – Mean Time Between Critical Failure (MTBCF)** Std = 120 hours (compute including all primary mission systems)	**E2 – ECM/ECCM** Std = fully effective against STAR-E18 Table 3 threats
SE3 – Deficiency Resolution Std = CAT-1 DRs, Dull swords. Unsatisfactory Reports (URs – nuclear) resolved Within 90 days	**SU3 – Avg Mean Time to Repair** Std = 5 hours	**E3 – Interoperability** Std = meets all TO-051-C Table 7 IERs
SE4 – Dropped Objects Std = 1/50,000 flying hours	**SU4 – Total Not Mission Capable for Maintenance (TNMCM)** Std =	**E4 – Mission Capable (MC) Rate** Std = 0.70 (operation fleet)
SE5 – Unit ORIs/NSIs/UCIs Std = all certified O&M units Receive "Sat" or higher Rating for safety	**SU5 – Total Not Mission Capable for Supply (TNMCS)** Std =	**E5 – Mission Crew Effectiveness** Std = rating of 7 or higher for all Mission crews